SEQUENCE LISTING

<110>   BAKALETZ, et al.

<120>   NONTYPEABLE HAEMOPHILUS INFLUENZAE VIRULENCE FACTORS

<130>   28335/39196A

<140>   To be assigned
<141>   Herewith

<150>   US 60/458,234
<151>   2003-03-27

<160>   41

<170>   PatentIn version 3.2

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Pro Gln Thr Ala Asp Ala Gly Thr Ser Met Asn Val Val Thr Glu Gln
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Ile Tyr Asn Lys Leu Phe Asp Ile Lys Asn His Ser Ala Thr Leu Thr
65                  70                  75                  80


Pro Met Leu Ala Gln Ser Tyr Ser Ile Ser Ala Asp Gly Lys Glu Ile
                85                  90                  95


Leu Leu Asn Leu Arg His Gly Val Lys Phe His Gln Thr Pro Trp Phe
            100                 105                 110


Thr Pro Thr Arg Asp Phe Asn Ala Glu Asp Val Val Phe Ser Ile Asn
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Val Thr Tyr Ser Asn Pro Gln Tyr Arg Val Phe His Glu Gln Ala Arg
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Lys Val Arg Phe Pro Tyr Phe Asp Ser Ile Lys Leu Asn Glu Lys Ile
            165             170             175

Lys Ser Val Thr Ala Leu Ser Pro Tyr Gln Val Lys Ile Glu Leu Phe
            180             185             190

Ala Pro Asp Ser Ser Ile Leu Ser His Leu Ala Ser Gln Tyr Ala Ile
        195             200             205

Ile Phe Ser Gln Glu Tyr Ala Tyr Gln Leu Ser Ala Asp Asp Asn Leu
    210             215             220

Ala Gln Leu Asp Thr His Pro Val Gly Thr Gly Pro Tyr Gln Val Lys
225             230             235             240

Asp Tyr Val Tyr Asn Gln Tyr Val Arg Leu Val Arg Asn Glu Asn Tyr
            245             250             255

Trp Lys Lys Glu Ala Lys Ile Glu His Ile Ile Val Asp Leu Ser Thr
        260             265             270

Asp Arg Ser Gly Arg Leu Val Lys Phe Phe Asn Asn Glu Cys Gln Ile
        275             280             285

Ala Ser Tyr Pro Glu Val Ser Gln Ile Gly Leu Leu Lys Asn Asp Asp
        290             295             300

Lys His Tyr Tyr Met Gln Ser Thr Asp Gly Met Asn Leu Ala Tyr Leu
305             310             315             320

Ala Phe Asn Phe Asp Lys Pro Leu Met Arg Asp His Glu Ile Arg Ala
            325             330             335

Ala Ile Ser Gln Ser Leu Asn Arg Ala Arg Ile Ile His Ser Ile Tyr
            340             345             350

His Asn Thr Ala Thr Val Ala Asn Asn Ile Ile Pro Glu Val Ser Trp
        355             360             365

Ala Ser Thr Val Asn Thr Pro Glu Phe Glu Phe Asp Tyr His Pro Lys
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Glu Met Ile Lys Trp Asp Leu Ala Gln Ala Gly Val Lys Val Lys Val
            420             425             430

Arg Ala Val Thr Arg Pro Phe Leu Thr Ala Gln Leu Arg Asn Gln Ser
        435             440             445

Glu Asn Tyr Asp Leu Ile Leu Ser Gly Trp Leu Ala Gly Asn Leu Asp
    450             455             460

Pro Asp Gly Phe Met Arg Pro Ile Leu Ser Cys Gly Thr Lys Asn Glu
465             470             475                     480

Leu Thr Asn Leu Ser Asn Trp Cys Asn Glu Glu Phe Asp Gln Phe Met
            485             490             495

Asp Arg Ala Ile Thr Thr Ser His Leu Ser Ser Arg Ala Lys Ala Tyr
        500             505             510

Asn Glu Ala Gln Glu Leu Val Leu Arg Glu Leu Pro Ile Ile Pro Ile
        515             520             525

Ala Asn Val Lys Arg Ile Leu Val Ala Asn Ser Arg Val Lys Gly Val
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Lys Met Thr Pro Phe Gly Ser Leu Asp Phe Ser Thr Leu Tyr Phe Ile
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Gln Glu Lys His


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            20              25                      30
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Asn Ala Asn Leu Val Thr Gln Asn Ile Tyr Ile Gly Tyr Phe His Tyr
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Leu Gly Thr Leu Leu Gln Gly Asp Phe Gly Ile Thr Tyr Asn Gly Gly
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Lys Ser Leu Met Asn Leu Ile Leu Thr Val Leu Pro Pro Thr Leu Glu
65   70   75   80

Leu Cys Phe Ile Thr Leu Phe Leu Ala Phe Ile Phe Gly Leu Pro Leu
             85   90   95

Gly Ile Ile Ser Ala Val Asn Ser Glu Gln Val Phe Ala Lys Ser Leu
             100   105   110

Gln Ile Leu Ser Tyr Val Gly Leu Ser Ile Pro Ile Phe Trp Leu Ala
         115   120   125

Pro Ile Leu Leu Tyr Val Ala Ala Leu Ser His Trp Glu Ile Ala Ala
     130   135   140

Ile Gly Gln Tyr Asn Leu Leu Tyr Glu Ile Lys Pro Ile Thr Gly Phe
145   150   155   160

Pro Val Ile Asp Met Trp Phe Met Glu Val Pro Tyr Arg Thr Lys Ile
             165   170   175

Val Gln Asn Ile Leu Gln His Leu Ala Leu Pro Thr Leu Val Leu Cys
         180   185   190

Ile Leu Pro Thr Met Glu Ile Ile Arg Ile Ile His Gln Arg Ala Glu
     195   200   205

Tyr Ile Leu Asn Gln Asn Phe Ser Lys Val Ala Thr Thr Arg Gly Trp
     210   215   220

Ser Lys Trp Lys Ile Leu His Gln Tyr Val Phe Arg Asn Thr Phe Pro
225   230   235   240

Leu Leu Val Pro Gln Val Pro Arg Val Phe Thr Leu Val Leu Thr Gln
             245   250   255

Cys Met Leu Val Glu Thr Ala Leu Gly Trp Pro Gly Ile Gly Arg Trp
             260   265   270

Leu Ile Asn Ala Val Asn Glu Gln Asp Tyr Asn Ser Ile Ala Ala Gly
     275   280   285

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Val Ile Val Ile Gly Val Cys Ile Ile Leu Ile Asp Thr Phe Thr Lys
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            20                  25                  30

Tyr Leu Leu Ile Ala Leu Ile Phe Thr Ala Leu Phe Ala Ser Tyr Leu
        35                  40                  45

Ala Pro Tyr Ala Asp Asn Arg Gln Phe Ile Gly Gln Glu Leu Met Pro
    50                  55                  60

Pro Ser Trp Val Asp Arg Gly Lys Ile Ala Phe Phe Phe Gly Thr Asp
65                  70                  75                  80

Asp Leu Gly Arg Asp Ile Leu Ser Arg Leu Ile Met Gly Thr Arg Tyr
            85                  90                      95

Thr Leu Gly Ser Ala Leu Leu Val Val Phe Ser Val Ala Ile Ile Gly
            100                 105                 110

Gly Ala Leu Gly Ile Ile Ala Gly Leu Leu Lys Gly Ile Lys Ala Arg
            115                 120                 125

Phe Val Gly His Ile Phe Asp Ala Phe Leu Ser Leu Pro Ile Leu Leu
    130                 135                 140

Ile Ala Val Val Ile Ser Thr Leu Met Glu Pro Ser Leu Trp Asn Ala
145                 150                 155                 160

Met Phe Ala Thr Leu Leu Ala Ile Leu Pro Tyr Phe Ile His Thr Ile
            165                 170                 175

Tyr Arg Ala Ile Gln Lys Glu Leu Glu Lys Asp Tyr Val Val Met Leu
            180                 185                 190
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Lys Leu Glu Gly Ile Ser Asn Gln Thr Leu Leu Lys Ser Thr Ile Leu
        195                 200             205

Pro Asn Ile Thr Val Ile Tyr Ile Gln Glu Val Ala His Ala Phe Val
        210                 215             220

Ile Ala Val Leu Asp Ile Ser Ala Leu Ser Phe Ile Ser Leu Gly Ala
225             230                 235                 240

Gln Arg Pro Thr Pro Glu Trp Gly Ala Met Ile Lys Asp Ser Leu Glu
                245                 250             255

Leu Leu Tyr Leu Ala Pro Trp Thr Val Leu Leu Pro Gly Phe Ala Ile
            260                 265                 270

Ile Phe Thr Ile Leu Leu Ser Ile Ile Phe Ser Asn Gly Leu Thr Lys
        275                 280                 285

Ala Ile Asn Gln His Gln Glu
    290             295


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            20                  25              30

Gly Glu Ile Ser Gly Leu Val Gly Glu Ser Gly Ser Gly Lys Ser Leu
            35                  40                  45

Ile Ala Lys Val Ile Cys Asn Ala Ile Lys Glu Asn Trp Ile Ile Thr
    50                  55                  60

Ala Asp Arg Phe Arg Phe His Asp Ile Glu Leu Leu Lys Leu Ser Pro
65                  70                  75                  80

Asn Lys Arg Arg Lys Ile Val Gly Lys Glu Ile Ser Met Ile Phe Gln
            85                  90                  95

Asn Pro Leu Ser Cys Leu Asp Pro Ser Arg Lys Ile Gly Lys Gln Leu
            100                 105                 110
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Ile Gln Asn Ile Pro Asn Trp Thr Phe Lys Asn Lys Trp Trp Lys Trp
        115                 120             125

Phe Gly Trp Lys Lys Arg Arg Ala Ile Glu Leu Leu His Arg Val Gly
        130             135             140

Ile Lys Asp His Arg Asp Ile Met Ala Ser Tyr Pro Asn Glu Leu Thr
145                 150             155                 160

Glu Gly Glu Gly Gln Lys Val Met Ile Ala Met Ala Val Ala Asn Gln
                165             170             175

Pro Arg Leu Leu Ile Ala Asp Glu Pro Thr Asn Thr Leu Glu Ser Thr
        180             185             190

Thr Ala Leu Gln Val Phe Arg Leu Leu Ser Ser Met Asn Gln Asn Gln
        195             200             205

Gly Thr Thr Ile Leu Leu Thr Ser Asn Asp Ile Lys Ser Ile Ser Glu
        210             215             220

Trp Cys Asp Gln Ile Ser Val Leu Tyr Cys Gly Gln Asn Thr Glu Ser
225                 230             235                 240

Ala Pro Thr Glu Ile Leu Ile Glu Ser Pro His His Pro Tyr Thr Gln
                245             250             255

Ala Leu Ile Asn Ala Val Pro Asp Phe Thr Gln Pro Leu Gly Phe Lys
        260             265             270

Thr Lys Leu Gly Thr Leu Glu Gly Thr Ala Pro Ile Leu Glu Gln Met
        275             280             285

Pro Ile Gly Cys Arg Leu Gly Pro Arg Cys Pro Phe Ala Gln Lys Lys
        290             295             300

Cys Met Glu Lys Pro Arg Arg Leu Lys Ile Lys Gln His Glu Phe Ser
305             310             315                 320

Cys His Tyr Pro Ile Asn Leu Arg Glu Lys Asn Phe Lys Glu Lys Thr
                325             330             335

Thr Ala Thr Pro Phe Ile Leu Asn Cys Lys Gly Asn Glu
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<213> Homo sapiens

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Phe Thr Leu Glu Arg Lys Gln Thr Leu Ala Ile Ile Gly Asn Asn Gly
        35                  40                  45

Ser Gly Lys Ser Thr Leu Val Lys Met Ile Ala Gly Ile Ile Pro Pro
    50                  55                  60

Thr Ser Gly Arg Ile Leu Phe Asn Asp Arg Glu Leu Gln Tyr Gln Asp
65                  70                  75                  80

Ala Gln Ser Arg Ala Lys His Ile Arg Met Val Phe Gln Asp Ala Asn
            85                  90                  95

Ser Ala Phe Asn Pro Arg Leu Asn Ile Gly Gln Ile Leu Asp Glu Pro
            100                 105                 110

Leu Ser Leu Ala Thr Asp Trp Thr Glu Thr Gln Arg Asn Glu Lys Ile
        115                 120                 125

Phe Glu Thr Leu Ser Leu Val Gly Leu Tyr Pro Asp Tyr Thr Asn Leu
    130                 135                 140

Asn Ile Lys His Leu Ser Ile Ser Gln Lys Gln Arg Val Ala Leu Ala
145                 150                 155                 160

Arg Ala Leu Ile Leu Ala Pro Glu Ile Ile Ile Asp Asp Ala Ile
                165                 170                 175

Gly Asn Leu Asp Ala Ser Val Arg Ile Gln Leu Leu Asn Leu Thr Leu
            180                 185                 190

Asp Leu Gln Gln Arg Leu Gly Ile Ser Tyr Ile Tyr Val Gly Gln Asp
        195                 200                 205

Leu Gly Val Ile Lys His Ile Ala Asp Thr Ile Ile Val Met Asp Asp
    210                 215                 220

Gly Lys Met Ile Glu Tyr Gly Ser Pro Gln Asn Leu Phe Thr Asp Pro
225                 230                 235                 240
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Gln Thr Asp Val Thr Arg Arg Leu Val Glu Ser Tyr Phe Gly Lys Ile
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Leu Asp Glu Thr Ala Trp Val Lys Asp Lys Asn Thr His
              260   265

<210> 12
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<213> H. influenzae

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Ala Ile Leu Ala His Tyr Leu Gly Asn Thr Asp Phe Ser His His Tyr
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His Ile Ser Ala Leu Ile Ile Ala Ile Leu Leu Gly Met Ala Ile Gly
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Asn Thr Ile Tyr Pro Gln Phe Ser Thr Gln Val Glu Lys Gly Val Leu
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Phe Ala Lys Gly Thr Leu Leu Arg Thr Gly Ile Val Leu Tyr Gly Phe
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Arg Leu Thr Phe Gly Asp Ile Ala Asp Val Gly Leu Asn Ala Val Val
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Thr Asp Ala Ile Met Leu Ile Ser Thr Phe Phe Leu Thr Ala Leu Leu
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Ala Gly Cys Ser Ile Cys Gly Ala Ala Ala Val Met Ala Ala Glu Pro
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Val Thr Lys Ala Glu Ser His Lys Val Ser Val Ala Ile Ala Val Val
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Val Ile Phe Gly Thr Leu Ala Ile Phe Thr Tyr Pro Leu Phe Tyr Thr
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Trp Ser Gln Asp Leu Ile Asn Ala His Gln Phe Gly Ile Tyr Val Gly
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Ser Ser Val His Glu Val Ala Gln Val Tyr Ala Ile Gly Glu Asn Ile
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Met Met Leu Ala Pro Phe Leu Leu Met Leu Ser Trp Leu Leu Thr Arg
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Ser Asn Gly Val Ser Glu Asn Thr Ser His Lys Ile Thr Ile Pro Trp
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Phe Ala Val Leu Phe Ile Gly Val Ala Ile Phe Asn Ser Phe Asp Leu
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Leu Pro Lys Glu Leu Val Lys Leu Leu Val Glu Ile Asp Ser Phe Leu
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Ile Lys Lys Ala Gly Leu Lys Pro Leu Val Leu Gly Thr Leu Ile Tyr
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Gln Leu Glu Gln Ile Asn Val Ser Gly Ser Thr Glu Asn Ser Asp Ser
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Lys Thr Pro Pro Lys Ile Ala Glu Thr Val Lys Thr Ala Lys Thr Leu
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Glu Arg Glu Gln Ala Asn Asn Ile Lys Asp Ile Val Lys Tyr Glu Thr
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Gly Val Thr Val Val Glu Ala Gly Arg Phe Gly Gln Ser Gly Phe Ala
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Ile Arg Gly Val Asp Glu Asn Arg Val Ala Ile Asn Ile Asp Gly Leu
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Arg Gln Ala Glu Thr Leu Ser Ser Gln Gly Phe Lys Glu Leu Phe Glu
145   150   155   160

Gly Tyr Gly Asn Phe Asn Asn Thr Arg Asn Gly Ala Glu Ile Glu Thr
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Leu Lys Glu Val Asn Ile Thr Lys Gly Ala Asn Ser Ile Lys Ser Gly
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Ser Gly Ser Leu Gly Gly Ser Val Ile Tyr Lys Thr Lys Asp Ala Arg

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Asp Tyr Leu Leu Asn Lys Asp Tyr Tyr Val Ser Tyr Lys Lys Gly Tyr
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Tyr Lys Lys Phe Asp Val Leu Val Val Thr Thr Ser Arg Asn Gly His
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Glu Leu Glu Asn Tyr Gly Tyr Lys Asn Tyr Asn Asp Lys Ile Gln Gly
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Lys Arg Arg Glu Lys Ala Asp Pro Tyr Lys Ile Glu Gln Asp Ser Thr
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Leu Leu Lys Leu Ser Phe Asn Pro Thr Glu Asn His Arg Phe Thr Leu
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Ala Ala Asp Leu Tyr Glu His Arg Ser Arg Gly Gln Asp Leu Ser Tyr
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Thr Leu Lys Tyr Leu Lys Thr Leu Pro Asp Leu Pro Glu Val Asp Ser
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Arg His Thr Asn Asp Lys Thr Lys Arg His Asn Ile Ser Phe Ser Tyr
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Ser Lys Gln Lys Ile Lys Thr Arg Ala Arg Thr Asp Glu Tyr Cys Asp
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Ala Gly Val Arg Tyr Cys Glu Gly Thr Ala Asn Pro Ala Gly Leu Lys
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Leu Lys Asn Gly Glu Ile Thr Arg Arg Asp Gly Thr Pro Leu Gln Phe
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Lys Glu Ile Asn Asn Thr Thr Thr Pro Asn Ser Asn Ser Asn Lys Asp
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Lys Thr Tyr Asp Phe Ser Lys Leu Ile Asp Thr Asn Gly Lys Glu Ile
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Lys Lys Val Leu Asn Gly Lys Glu Phe Ala Arg Ile Asn Asn Gly Thr
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Arg Gly Lys Thr Phe Pro Ile Leu Pro Ser Ser Leu Gly Tyr Leu Glu
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Arg Leu Trp Gln Glu Arg Asp Leu Asp Thr Asn Thr Gln Gln Leu Asn
    530             535             540

Leu Asp Leu Thr Lys Asp Phe Lys Thr Trp Arg Val Glu His Asn Leu
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Gln Tyr Gly Ser Ser Tyr Asn Thr Thr Met Lys Arg Met Val Asn Arg
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Ala Gly Tyr Asp Ala Thr Asp Val Gln Trp Trp Ala Lys Arg Thr Leu
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Gly Thr Arg Phe Asp Phe Leu Lys Asn Glu Glu Ile Val Glu Thr Cys
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Ala Thr Thr Phe Gly Trp Asn Ala Phe Leu Cys Pro Arg Val Asp Pro
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Glu Phe Ser Tyr Leu Leu Pro Ile Lys Thr Lys Glu Lys Ser Val Tyr
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Leu Phe Asp Asn Val Val Ile Thr Asp Tyr Leu Ser Phe Asp Leu Gly
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Tyr Arg Tyr Asp Asn Ile His Tyr Gln Pro Lys Tyr Lys His Gly Val
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Thr Pro Lys Leu Pro Asp Asp Ile Val Lys Glu Leu Phe Ile Pro Leu
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Lys Ser Gly Gln Asn Asn Asn Asp Ala Glu Val Lys Lys Asn Val Gln
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Gln Leu Lys Tyr Ser Lys Gly Phe Arg Ala Pro Thr Ser Asp Glu Met
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Tyr Phe Thr Phe Lys His Pro Asp Phe Thr Ile Leu Pro Asn Thr His
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Leu Lys Pro Glu Ile Ala Lys Thr Lys Glu Ile Ala Phe Thr Leu His
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His Asp Asp Trp Gly Phe Ile Ser Thr Ser Leu Phe Lys Thr Asn Tyr
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Arg Asp Phe Ile Asp Leu Val Tyr Lys Gly Glu Arg Glu Phe Glu Val
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Gly Asn Pro Asn Asn Arg Gly Lys Ile Ser Phe Asp Thr Phe Gln Asn
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Ile Asn Arg Asp Ser Ala Val Val Lys Gly Ile Glu Ile Asn Ser Lys·
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Val Phe Leu Gly Lys Met Ala Lys Phe Met Asp Gly Phe Asn Leu Ser
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Tyr Lys Tyr Thr Tyr Gln Lys Gly Arg Met Asp Gly Asn Ile Pro Met
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Asn Ala Ile Gln Pro Lys Thr Met Val Tyr Gly Leu Gly Tyr Asp His
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Pro Ser Gln Lys Phe Gly Phe Asn Phe Tyr Thr Thr His Val Ala Ser
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Thr Asn Thr Ser Ile Lys Trp Arg Ser Lys Ser Tyr Thr Ile Leu Asp
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agcttcaaca acagtaacgc ccgtctcgta tttaacgatg cctttaatat tggtttgttt    5340

gttccttttc catcgtttta acctcgtttt accgttctt tatattctcc gtcggctctt     5400

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ttatttctct tgtcttttct tgtctctcat ctatactact tctcatactc tttttgcttt    5520

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<223> n = a, c, g, or t

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agaaaataat aagaatagtt tttatttctt gatttttatc aaaaatcaat ctttattgtt   180

gtgagaaaat gcttcctcgt ataatatatt tgagaattat tattattttt ttataggatt   240

aaatatgacc aattttagat taaacgtgct tgcctattcc gttatgcttg ggctaacggc   300

aagtgttgct tatgcagagc caaccaacca accaaccaac caaccaacca accaaccaac   360

caaccaacca accaaccaac caaccaaaat agtaatgctt ctgaacaact agaacaaata   420

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gtaaaaacgg ctaaaacgct agaaagagaa caagcaaaca acattaaaga catcgttaaa   540

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agaggggtag atgaaaatcg tgttgcaatt acggttgatg gcgttgctca agcagaacat   660

tatcttccca aggttttaaa gacctgtttg aaggatatgg taattttaat aacacgcgta   720

atggaattga aattgaaact ttatctgatg ccaaaattac caaaggtgca gattctctca   780

tgtctggtag tggtgcattg ggtggctccg tcatctataa aactaaagat gcaagagatc   840

ttctgcttaa caaaaactac gcgtttaaat ataaaactgg ttttaccagc gagaatgatg   900

aaagattaaa ttctattact tttgcaggaa aagcaagtat attcgatgta cttgctgtcg   960

gcacttggcg taatggtcat gaaatcaaaa attatgatta caaatctgca gacgacattc   1020

taggaaaact cagagaaaag accgatcctt ataataaaaa agaccgcagt cttttattga   1080

aaattggtac aaatcttggt gaaaataatc gcattgccgt agcctatgat agaagacggg   1140

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atgataatga aatagatact cgccatactc atgatgaaag cattagaacc agtaaatcta   1260

tagcatttga aaatacaaat ataaacccac tttgggatac cctaaaactc tcttatacag   1320

atcaaagtat tactcaacga gcaagaagtg acgaacattg tgatggtgaa cggtgtcctg   1380

gggtacaaaa ccccatagga ctacattata acaacgataa taaacttgtt gataaaaata   1440

-31-

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aatggaaact taaagaatat ggtggaaaat attatattga ctcgcctcgc tgctttaaaa    1620

atcacggtga tgctaatcac gaggggatgt gtagactaag atctgatgta aaagaggaaa    1680

aggaaacatt agtagctaat aacatcactt atgatttaaa aaaggagtat tttattaact    1740

caaggctcac gaatagtgat aatttattat cttgtgatgg aattaactgt gataaaggta    1800

caattcaagg tttcgaagct gatggaacgc ctaaggattt accaataaaa ataatcccaa    1860

aagaaggtaa aaaatttgca cttattgaaa aaatttcaga tcaaaatggc tacaatattg    1920

gcccagagaa agcatctcgt tttctagtac ctaattcacc tggttataat agaaacattt    1980

ggaaaaaacg tgaccttgat actcgtactc aacaaattaa tttggattta acaaaacatt    2040°

ttgaactagg aaaaagccaa catgatttat cttatggttt agtttggagt aaaacaacaa    2100

aatcaatgat aaataaagaa gggttaaaag ttaatagtgg aaaatggtgg attgattatc    2160

caaaagactg tgaatctagt acatcagatt tatgtacaaa aaatagtaca gcatcatttc    2220

ttattcctgt agaaacaaaa gatggttctc tctattttaa agatgaattt agagtaaatg    2280

atcgtcttgg cttagatatc ggttatcgat atgacaaagt caaatacaaa accaattatc    2340

aaccgggtat aacgccaaaa atccctgatg atatgttagt taatttattt ataaaagaac    2400

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aaaatgcaga agctaatatt aattatattt ctcaacccaa aaaatttaat gcgagttctt    2520

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ctgttcttcc aggctctaaa ttaaaacctg aaattgcaaa aactaaggaa ttatcattaa    2700

ctttacatga tgatgaaatc ggttttattt ctggtggata tttcatcaca aattataata    2760

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aattatatca atctgttaat ttagataatg ctaaagtgac aggatttgaa ttgaaaacca    2880

aatttacatt aggaaaatgg atatcatggt tgaagaatgt tgattttggt taccaattaa    2940

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caggagataa agaatatgtt caaaataaac atattaaatg gcgtagtaaa gcttacacag    3180

tgacagattt tactttcttc gtgaaaccta tgaagaattt aactttacga gcgggtgttt    3240

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<211> 3494
<212> DNA
<213> H. influenzae

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tttagctaaa cgctccccca atgtgttaat tggctcaaaa tacattactg caatatactg   180

tttattaaat cgtttacctt tacccgaaaa ctaccaagat cacgcattag taggagagtg   240

gaaaggttat cgagattgcc atattcaagg caatttggta ctgatttacc aatacgttat   300

acacgatgaa tttgatgaat tgaaattttc tcgtttaaat acacactcac aaaccgcttt   360

aaaatagaag taatcttaaa taataatccg cacgtaaaat gtgcggatta tttttacata   420

ggattaaaat tcaaactgaa cagacattct gtaatttctg ccaggtgcat aaaagcggtt   480

taagccttca ccagtttctg tttttactcg gttaattgtg ccaagatgtc gaacagagcg   540

agcagagtcc caagtgagat attttttgtt ggttaaatta tatacaccag cggtaaatgt   600

aagattttta attggtttcc aataggcaat cgtatcgatc actgtatagc gattattacg   660

ccataatccg cgagaatctt ttacatcttt gccgtttgct tttgtagcag gtatatctgt   720

tgcattgtca gtatattgct tttcttttct ggcgaccata cttgtccatt gagaattaaa   780

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aatttcgata cctctgactc ttgctcgatc tcgattttgg ttttgatgga acggatattt   1140

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acacggtgtg tcgtaagtgc aattttcata tcctggaggt attgagtatt tactaccata   1560

aacatattcc tttgagctaa atttcttaaa tagcccagta attaatccat taggaacagg   1620

aatgtttttg tcataactag gcaaatattt tacgtggtca taacgataat ttaaatctag   1680

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tcctagccaa gaggtaagtt gcacattatc tccaaaatac aacacattat ttttagtggt    1740

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gtgaaattct ttgtctaaat caagtttaat ttgttgggta tgggtgttta aatcacggtc    2040

attaacgaag tctgtgctgt agccatggct ttttggaaat aaaaatttag cactttcata    2100

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gaccgaatca agtgagcctc cttctgtatc tacatcatta ctaacatctt caccctttt    2340

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acaagtggat tgatgacaat actcatcaga gcgtgcttta ttggtaattt tttgtgagga    2520

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-34-.

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<211> 5002
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<213> H. influenzae

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<223> n = a, c, g, or t

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<222> (4914)..(4915)
<223> n = a, c, g, or t

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attatggtaa taaaactgca acagacttgc cagtaagcgg tgtagcaacg tataaaggaa    1860

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caaagaatgg tgatataggc ttaataagtg aatttagtgc agattttggg actaaaaaac    2040

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gacaagtaga aaaaaccaac aagtagaaac aaccaacaag tagaaaaaaa caaataatgg    3240

aatactaaaa atgactaaaa aaccctattt tcgcctaagt attatttctt gtcttttaat    3300

ttcatgctat gtaaaagcag aaactcaaag tataaaagat acaaaagaag ctatatcatc    3360
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-36-

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tgaaagtatc agccgagaac aagtattaaa tattcgtgat ctaacacgct atgatccagg    3540

gatttcagtt gtagaacaag tcgcggtgc aagttctgga tattctattc gtggtatgga    3600

cagaaataga gttgctttat tagtagatgg tttacctcaa acgcaatctt atgtagtgca    3660

aagcccttta gttgctcgtt caggatattc tggcactggt gcaattaatg aaattgaata    3720

tgaaaatgta aaggccgtcg aaataagcaa ggggggagt tcttctgagt atggtaatgg    3780

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<213> H. influenzae

<400> 21

-37-

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<400> 22

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<210> 25
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<210> 26
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Ser Arg Gly Gln Asp Leu Ser Tyr Thr Leu Lys
1               5               10


<210>   31
<211>   12
<212>   PRT
<213>   H. influenzae

<400>   31

Tyr Glu Thr Gly Val Thr Val Val Glu Ala Gly Arg
1               5               10


<210>   32
<211>   11
<212>   PRT
<213>   H. influenzae

<400>   32

Asn Pro Glu Asp Thr Tyr Asp Ile Tyr Ala Lys
1               5               10


<210>   33
<211>   11
<212>   PRT
<213>   H. influenzae
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<400> 33

Phe Thr Leu Ala Ala Asp Leu Tyr Glu His Arg
1   5   10

<210> 34
<211> 13
<212> PRT
<213> H. influenzae

<400> 34

Glu Leu Phe Glu Gly Tyr Gly Asn Phe Asn Asn Thr Arg
1   5   10

<210> 35
<211> 14
<212> PRT
<213> H. influenzae

<400> 35

Thr Met Val Tyr Gly Leu Gly Tyr Asp His Pro Ser Gln Lys
1   5   10

<210> 36
<211> 16
<212> PRT
<213> H. influenzae

<400> 36

Val Glu His Asn Leu Gln Tyr Gly Ser Ser Tyr Asn Thr Thr Met Lys
1   5   10   15

<210> 37
<211> 17
<212> PRT
<213> H. influenzae

<400> 37

Gly Tyr Ala Thr Glu Asn Asn Gln Ser Phe Asn Thr Leu Thr Ala Gly
1   5   10   15

Arg

<210> 38
<211> 19
<212> PRT
<213> H. influenzae

<400> 38

Lys Gly Tyr Ala Thr Glu Asn Asn Gln Ser Phe Asn Thr Leu Thr Leu
1   5   10   15

Ala Gly Arg

<210> 39
<211> 901
<212> DNA
<213> H. influenzae

<220>
<221> misc_feature
<222> (1)..(2)
<223> n = a, c, g, or t

<220>
<221> misc_feature
<222> (10)..(10)
<223> n = a, c, g, or t

<220>
<221> misc_feature
<222> (28)..(28)
<223> n = a, c, g, or t

<400> 39
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gtttttatgg gaattaaaat gaccgatttt agattaaaca aacatcccta ttccgttatg   120

cttgggctaa cggcaggtgt tgcttatgca gctcaaccaa ccaaccaacc aaccaaccaa   180

ccaaccaacc aaccaaccaa ccaaaatggt aatgtttctg aacaactaga gcaaattaat   240

gtatctggtt ctaccgaaga tagtgataca aaaacaccac caaaaattgc tgaaacggta   300

aaaacggcca aaacgccccc cccagaacaa gcaaacaata ttaaagacat cgccaaatac   360

catacgggtg ttattgtccc tgaagctggg ctttttcgtc caaccgctcc cccattcgtg   420

ttgtccataa caccccccca tttattacta ccgcccgctt acgttcacat ctttcctttt   480

cttcgccgcg ctttcatcat ttttctccgg cattttaca taagtagtcc cttcccgctt   540

ccctcctctc ctcttcctcc ttatttttat tatgatgttt ataagaatct cctctcttac   600

ctattccagc ctcgttgttc tactcgcctt ctgctaaccc tttctccctt ttccatcctc   660

tctacccgc cccccctttc tcttttttttt cccccttttt ctttttccccc caccccctcac   720

ttttccccgc tttatttttt acacacccc cgacacaaca ttcatctccc tttgtatccg   780

ctcatctttc ccccccccc cccaccatcc tccgcactct atctttccat tctataccc   840

cccttcccctt ttccccccccc cccccctttc cgactgcaat ttttttttctt ctcccccctcc   900

g   901

<210> 40
<211> 2979
<212> DNA
<213> H. influenzae

<400> 40
atgggaatta aaatgaccga ttttagatta aacaaacatc cctattccgt tatgcttggg   60

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ctaacggcag gtgttgctta tgcagctcaa ccaaccaacc aaccaaccaa ccaaccaacc    120

aaccaaccaa ccaaccaaaa tggtaatgtt tctgaacaac tagagcaaat taatgtatct    180

ggttctaccg aaaatagtga tacaaaaaca ccaccaaaaa ttgctgaaac ggtaaaaacg    240

gctaaaacgc tggaaagaga acaagcaaac aatattaaag acatcgttaa atacgagacg    300

ggcgttactg ttgttgaagc tgggcgtttt gggcaaagcg gttttgccat tcgtggtgta    360

gatgaaaacc gtgtagcgat taatattgat ggattacgtc aagctgaaac cctatcttct    420

caaggcttta aagagctttt tgagggttat ggtaacttca ataatacgcg taatggtgca    480

gaaattgaaa cttttaaaga agtaaatatt acaaaagggg caaattcaat caaaagtggt    540

agtggttcct taggtggatc tgtaatttat aaaacaaaag atgcgagaga ttatctcctt    600

aacaaggatt actatgtaag ctacaaaaag ggatacgcta cagaaaataa tcaatcattc    660

aataccctta ctcttgcagg acgttataaa aagtttgatg ccttagtggt tacaacaagc    720

agaaatggac acgaacttga aaactatgat tacaaaaatg caaatagcct tactcaaggt    780

aaaaaaagag aaaaagcaga cccatacaaa attgaacaag atagtacatt attaaaatta    840

tcttttaacc ctacagaaaa tcatcgtttt acccttgcag cagatttata tgaacatcgt    900

tctcgtgggc aagatttatc ctatacacta aaatatcaaa aaacagatcc taatttactc    960

gaggttgatt ctagacacac caatgataaa acaaagagac gtaatatttc ctttagctat   1020

gaaaatttct ctcaaacgcc attttgggat acattaaaaa tcacttattc agatcaacgt   1080

attaaaactc gcgcacgtac agatgactat tgtgatgcag gtgtaagata ttgtgaggga   1140

actgcaaatc ctgcgggact aaaattaaca gatgggaaaa taacacgtcg agatggttca   1200

gaacttcaat ttgaaaaaaa agataaaaat attgataaca acatctatga cttcgataaa   1260

tttattgata ctgatgatcg agtaatagaa ggtaaactag gcctaaggag atcctctgga   1320

acttggtatg attgttcaat atttgattgt aaagataaaa caaaaatgaa aatttttgaa   1380

actgaacatc cttatggcta tggcactact ggaacgtgga aaaagactt tgaacttgaa    1440

ataaaaaaat aaatgacaa aaatttcgct agagtaaagg atgcgaataa taaaacatac   1500

tctattcttc cctcatctcc aggttattta gaacgcctct ggcaagagcg agatttagac   1560

accaacaccc aacaattaaa tttagattta accaaagact tcaaaacttg gcgtgttgaa   1620

cataatctac aatatggtag ctcatataat acaacgatga agcgaatggt taatcgtgct   1680

ggtaatgatg cttctgatgt gcaatggtgg gcagagccta cacttggtta cagttgttg   1740

tatgataaac ctcacacttg taaaaccgct tatggggggt ggaaagctaa cctttgccct   1800

cgagttgatc ctaaattttc attcttatta cccattaaaa caaaagaaaa atcagtctat   1860

ctctttgata atgttgttat aactgattat ttatcttttg atttgggtta tcgttatgac   1920

aatatccatt atcaaccaaa atataaacac ggcgttacac cgaaattacc tgatgatatt   1980
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gtgaaaggat tgtttattcc attaccaagt ggtaaaaata ataatgatga tcctgaagtt      2040

aagaaaaacg tacaacaaaa tattgactat atcgctaaac aaaacaaaaa atataaagca      2100

cattcttaca gttttgtttc aacgattgat ccaacgagtt ttcttcgttt acaactaaaa      2160

tattcaaaag gttttagagc accaacttca gatgaaatgt atttcacctt taaacaccct      2220

gatttcacta ttttgccaaa tactaatcta aaaccagaga tagcaaaaac aaaagaaatt      2280

gcttttacat tacataatga tgattggggt tttatctcca caagtctatt taaaaccaac      2340

tataaaaact ttatcgacct aatatttaaa ggagaaaaag attttaaatt agttagcgga      2400

ggtagcacat taccattttc tctttatcaa aatattaata gagatagtgc ggtagtaaaa      2460

ggaatagaaa ttaattcaaa agtattcctt ggtaaaatgg caaaatttat ggatggattt      2520

aacctaagct ataaatatac ctatcaaaaa ggaagaatgg atggcaatat tcctatgaat      2580

gcaattcagc ctaaaacgat ggtgtatggc ttaggctatg accacccaag ccaaaaattt      2640

ggatttaatt tctacactac ccacgtagca agtaaaaatc cagaagatac ttatgatatt      2700

tatgcgaaag ataaaaacca aaccaacact agcataaaat ggcgcagtaa atcttatact      2760

attctagatt taattggata tgtgcaacca attaaaaatt taaccataag agccggcgta      2820

tataatctta caaaccgtaa atacatcact tgggattctg cgcgttcaat tcgttcattt      2880

ggtacaagta atgttataga tcaaaagaca ggtcaaggca ttaaccgctt ctacgcacca      2940

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<210> 41
<211> 992
<212> PRT
<213> H. influenzae

<400> 41

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Met Gly Ile Lys Met Thr Asp Phe Arg Leu Asn Lys His Pro Tyr Ser
1               5                   10                  15


Val Met Leu Gly Leu Thr Ala Gly Val Ala Tyr Ala Ala Gln Pro Thr
            20                  25                  30


Asn Gln Pro Thr Asn Gln Pro Thr Asn Gln Pro Thr Asn Gln Asn Gly
        35                  40                  45


Asn Val Ser Glu Gln Leu Glu Gln Ile Asn Val Ser Gly Ser Thr Glu
    50                  55                  60


Asn Ser Asp Thr Lys Thr Pro Pro Lys Ile Ala Glu Thr Val Lys Thr
65                  70                  75                  80


Ala Lys Thr Leu Glu Arg Glu Gln Ala Asn Asn Ile Lys Asp Ile Val
                85                  90                  95
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Lys Tyr Glu Thr Gly Val Thr Val Val Glu Ala Gly Arg Phe Gly Gln
            100   105   110

Ser Gly Phe Ala Ile Arg Gly Val Asp Glu Asn Arg Val Ala Ile Asn
            115   120   125

Ile Asp Gly Leu Arg Gln Ala Glu Thr Leu Ser Ser Gln Gly Phe Lys
    130   135   140

Glu Leu Phe Glu Gly Tyr Gly Asn Phe Asn Asn Thr Arg Asn Gly Ala
145   150   155   160

Glu Ile Glu Thr Leu Lys Glu Val Asn Ile Thr Lys Gly Ala Asn Ser
            165   170   175

Ile Lys Ser Gly Ser Gly Ser Leu Gly Gly Ser Val Ile Tyr Lys Thr
            180   185   190

Lys Asp Ala Arg Asp Tyr Leu Leu Asn Lys Asp Tyr Tyr Val Ser Tyr
            195   200   205

Lys Lys Gly Tyr Ala Thr Glu Asn Asn Gln Ser Phe Asn Thr Leu Thr
            210   215   220

Leu Ala Gly Arg Tyr Lys Lys Phe Asp Ala Leu Val Val Thr Thr Ser
225   230   235   240

Arg Asn Gly His Glu Leu Glu Asn Tyr Asp Tyr Lys Asn Ala Asn Ser
            245   250   255

Leu Thr Gln Gly Lys Lys Arg Glu Lys Ala Asp Pro Tyr Lys Ile Glu
            260   265   270

Gln Asp Ser Thr Leu Leu Lys Leu Ser Phe Asn Pro Thr Glu Asn His
            275   280   285

Arg Phe Thr Leu Ala Ala Asp Leu Tyr Glu His Arg Ser Arg Gly Gln
    290   295   300

Asp Leu Ser Tyr Thr Leu Lys Tyr Gln Lys Thr Asp Pro Asn Leu Leu
305   310   315   320

Glu Val Asp Ser Arg His Thr Asn Asp Lys Thr Lys Arg Arg Asn Ile
            325   330   335

Ser Phe Ser Tyr Glu Asn Phe Ser Gln Thr Pro Phe Trp Asp Thr Leu
            340   345   350

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Lys Ile Thr Tyr Ser Asp Gln Arg Ile Lys Thr Arg Ala Arg Thr Asp
        355   360   365

Asp Tyr Cys Asp Ala Gly Val Arg Tyr Cys Glu Gly Thr Ala Asn Pro
        370   375   380

Ala Gly Leu Lys Leu Thr Asp Gly Lys Ile Thr Arg Arg Asp Gly Ser
385   390   395   400

Glu Leu Gln Phe Glu Lys Lys Asp Lys Asn Ile Asp Asn Asn Ile Tyr
                405   410   415

Asp Phe Asp Lys Phe Ile Asp Thr Asp Asp Arg Val Ile Glu Gly Lys
            420   425   430

Leu Gly Leu Arg Arg Ser Ser Gly Thr Trp Tyr Asp Cys Ser Ile Phe
            435   440   445

Asp Cys Lys Asp Lys Thr Lys Met Lys Ile Phe Glu Thr Glu His Pro
        450   455   460

Tyr Gly Tyr Gly Thr Thr Gly Thr Trp Lys Lys Asp Phe Glu Leu Glu
465   470   475   480

Ile Lys Lys Leu Asn Asp Lys Asn Phe Ala Arg Val Lys Asp Ala Asn
            485   490   495

Asn Lys Thr Tyr Ser Ile Leu Pro Ser Ser Pro Gly Tyr Leu Glu Arg
            500   505   510

Leu Trp Gln Glu Arg Asp Leu Asp Thr Asn Thr Gln Gln Leu Asn Leu
        515   520   525

Asp Leu Thr Lys Asp Phe Lys Thr Trp Arg Val Glu His Asn Leu Gln
        530   535   540

Tyr Gly Ser Ser Tyr Asn Thr Thr Met Lys Arg Met Val Asn Arg Ala
545   550   555   560

Gly Asn Asp Ala Ser Asp Val Gln Trp Trp Ala Glu Pro Thr Leu Gly
            565   570   575

Tyr Ser Leu Leu Tyr Asp Lys Pro His Thr Cys Lys Thr Ala Tyr Gly
            580   585   590

Gly Trp Lys Ala Asn Leu Cys Pro Arg Val Asp Pro Lys Phe Ser Phe
        595   600   605

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Leu Leu Pro Ile Lys Thr Lys Glu Lys Ser Val Tyr Leu Phe Asp Asn
    610   615   620

Val Val Ile Thr Asp Tyr Leu Ser Phe Asp Leu Gly Tyr Arg Tyr Asp
625   630   635   640

Asn Ile His Tyr Gln Pro Lys Tyr Lys His Gly Val Thr Pro Lys Leu
            645   650   655

Pro Asp Asp Ile Val Lys Gly Leu Phe Ile Pro Leu Pro Ser Gly Lys
          660   665   670

Asn Asn Asn Asp Asp Pro Glu Val Lys Lys Asn Val Gln Gln Asn Ile
        675   680   685

Asp Tyr Ile Ala Lys Gln Asn Lys Lys Tyr Lys Ala His Ser Tyr Ser
    690   695   700

Phe Val Ser Thr Ile Asp Pro Thr Ser Phe Leu Arg Leu Gln Leu Lys
705   710   715   720

Tyr Ser Lys Gly Phe Arg Ala Pro Thr Ser Asp Glu Met Tyr Phe Thr
          725   730   735

Phe Lys His Pro Asp Phe Thr Ile Leu Pro Asn Thr Asn Leu Lys Pro
        740   745   750

Glu Ile Ala Lys Thr Lys Glu Ile Ala Phe Thr Leu His Asn Asp Asp
        755   760   765

Trp Gly Phe Ile Ser Thr Ser Leu Phe Lys Thr Asn Tyr Lys Asn Phe
       770   775   780

Ile Asp Leu Ile Phe Lys Gly Glu Lys Asp Phe Lys Leu Val Ser Gly
785   790   795   800

Gly Ser Thr Leu Pro Phe Ser Leu Tyr Gln Asn Ile Asn Arg Asp Ser
          805   810   815

Ala Val Val Lys Gly Ile Glu Ile Asn Ser Lys Val Phe Leu Gly Lys
        820   825   830

Met Ala Lys Phe Met Asp Gly Phe Asn Leu Ser Tyr Lys Tyr Thr Tyr
        835   840   845

Gln Lys Gly Arg Met Asp Gly Asn Ile Pro Met Asn Ala Ile Gln Pro
    850   855   860

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Lys Thr Met Val Tyr Gly Leu Gly Tyr Asp His Pro Ser Gln Lys Phe
865             870             875             880


Gly Phe Asn Phe Tyr Thr Thr His Val Ala Ser Lys Asn Pro Glu Asp
                885             890             895


Thr Tyr Asp Ile Tyr Ala Lys Asp Lys Asn Gln Thr Asn Thr Ser Ile
            900             905             910


Lys Trp Arg Ser Lys Ser Tyr Thr Ile Leu Asp Leu Ile Gly Tyr Val
        915             920             925


Gln Pro Ile Lys Asn Leu Thr Ile Arg Ala Gly Val Tyr Asn Leu Thr
    930             935             940


Asn Arg Lys Tyr Ile Thr Trp Asp Ser Ala Arg Ser Ile Arg Ser Phe
945             950             955             960


Gly Thr Ser Asn Val Ile Asp Gln Lys Thr Gly Gln Gly Ile Asn Arg
            965             970             975


Phe Tyr Ala Pro Gly Arg Asn Tyr Lys Met Ser Val Gln Phe Glu Phe
        980             985             990
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